



U.S. Department  
of Transportation

**Research and  
Special Programs  
Administration**

**FEB 10 1999**

400 Seventh Street, S.W.  
Washington, D.C. 20590

DOT-E 12247

EXPIRATION DATE: January 31, 2002

(FOR RENEWAL, SEE 49 CFR § 107.109.)

1. GRANTEE. Weldship Corporation  
Bethlehem, PA
2. PURPOSE AND LIMITATION. This exemption authorizes the use of certain DOT Specification 3A or 3AA cylinders for the transportation in commerce of the compressed gases listed in paragraph 6 below. The cylinders are retested by utilizing the 100 percent ultrasonic examination (UE) procedures described in paragraph 7 below in place of the internal visual inspection and the hydrostatic retest required in § 173.34(e). This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.
3. REGULATORY SYSTEM AFFECTED. 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED. 49 CFR §§ 173.34 (e) (1), (e) (3), (e) (4), (e) (8), (e) (14), (e) (16), and 173.302(c) (2), (3), (4), and (5) in that ultrasonic examination is performed in place of the hydrostatic pressure test and internal visual examination.
5. BASIS. This exemption is based on Weldship's application dated March 5, 1999, and additional information dated August 25, October 13, November 8, 1999, and January 13, 2000 submitted in accordance with § 107.105 and the public proceeding thereon.

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6. HAZARDOUS MATERIALS (49 CFR § 172.101).

Proper Shipping Name/ Hazardous Materials Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Liquefied or nonliquefied compressed gases, or mixtures of such compressed gases, authorized in the Hazardous Materials Regulations for transportation in DOT 3A and 3AA cylinders.	Specific Hazard Class and Division applicable to the compressed gas or gas mixture to be shipped.	As listed in 49 CFR Part 172.101 for specific compressed gas or gas mixture.	N/A

7. SAFETY CONTROL MEASURES.

a. Packaging. Packaging prescribed is a DOT Specification 3A or 3AA cylinder that is subjected to periodic retesting, reinspection and marking prescribed in § 173.34(e), except that the cylinder is examined by an ultrasonic method in place of the hydrostatic pressure test and internal visual inspection prescribed in § 173.34(e)(1). Each cylinder must be retested and marked in accordance with the procedure described herein and Weldship's application for exemption on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA). A cylinder that has been exposed to fire or to excessive heat (temperatures of 1000°F. or greater) must not be retested under the terms of this exemption.

b. Ultrasonic equipment. The ultrasonic examination (UE) equipment described in the Weldship application on file with OHMEA must be used and perform in accordance with the procedures delineated therein and as detailed in this exemption. The equipment will be a fully automated, pulse echo type, and incorporate multiple transducers, with interactive software. The transducers must be arranged so that the ultrasonic beams are focused on a single location in the cylinder wall and all beams exit at the same location. The ultrasonic pulses must enter into the cylinder wall in both longitudinal and circumferential directions to ensure 100 percent coverage of the cylinder wall. The equipment

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must incorporate continuous automatic monitoring of the transducer to cylinder wall acoustic coupling to assure 100 percent cylinder wall coverage during UE. It must be capable of discerning and aborting the test when the ultrasonic data indicate a loss of acoustic coupling between the transducer assembly and the cylinder wall. This safety control measure should be an integral part of the test equipment design incorporating Lack-of-Expected-Response (L.E.R.) monitoring independent of operator actions. All defects must be detected and measured. The UE equipment must be capable of monitoring all acceptance/rejection criteria described in paragraph 7.d. of this exemption.

c. Equipment performance and test procedure. The ultrasonic equipment performance, test procedure, and rejection criteria must conform to Weldship's application except as specifically stated herein:

(1) Calibration Standards [Weldship APPENDIX VII].

(i) A cylinder used as a calibration standard must be of the same surface finish and metallurgical condition as the cylinders under test. The calibration standard cylinder must have a known minimum design wall thickness which is less than or equal to the cylinders under test. For the purpose of testing under this exemption, Weldship must have calibration cylinders that conform to the following:

(A) A calibration standard cylinder for testing cylinders 6-inch or smaller in diameter must have the same diameter.

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(B) A calibration standard cylinder for testing cylinders larger than 6-inch in diameter must conform to the following sizes:

Calibration Standards	Cylinders Tested
Cal. Cyl. (OD)	Cyl. Size (OD)
7 in.	6.5 to 8 in.
7.5 in.	6.5 to 8 in.
9 in.	8.25 to 10 in.
9.25 in.	8.5 to 10 in.
10 in.	9 to 14 in.
12 in.	10 to 16 in.
14 in.	14 to 18 in.
14.25 in.	14 to 18 in.
18 in.	18 to 24 in.
22 in.	20 to 26 in.
24 in.	24 to 30 in.

(C) Prior to machining for calibration defects and minimum wall thickness, the average minimum wall thickness for the calibration cylinder must be determined by means of an independent method. The calibration cylinder must be machined with defects simulating those that occur during service conditions, such as reduction in wall thickness (area corrosion), and line corrosion. The remaining wall thickness must conform to the design minimum wall for a cylinder under the test.

(ii) The calibration cylinders must be machined as detailed on Weldship Drawing 928803008-1 Rev. A to include the following simulated defects:

(A) A defect for reduction in wall thickness (area corrosion). Area corrosion must be less than or equal to 0.70 square inch (in<sup>2</sup>) and less than or equal to 1/20 of the design

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minimum wall thickness ( $t_m$ ) in depth. The remaining wall thickness must be at least the design minimum wall for a cylinder being tested. To achieve the reduction in wall thickness, a minimum of one area must be machined in the cylinder wall.

(B) A defect for isolated pits consisting of an internal flat bottom hole of 1/8 inch diameter and  $1/3t_m$  in depth for cylinders less than or equal to 4 inches in diameter.

(C) A defect for isolated pits consisting of an internal flat bottom hole of 1/4 inch diameter and  $1/3t_m$  in depth for cylinders greater than 4 inches in diameter.

(D) A defect for line corrosion in the side to base transition (SBT) area consisting of an internal circumferential notch  $0.10t_m$  in depth that must be 1 to 1.5 inches in length and less than or equal to 0.015 inch width located at SBT.

(iii) A drawing representing the above defects and a certification statement signed by a person certified as a Level III operator (in UE) must be available for inspection for each calibrated cylinder at each site where testing is performed.

(2) Calibration of Equipment [Weldship APPENDIX VIII].

System calibration must be performed using the calibration standards referenced in section 7.c. of this exemption and that of Weldship Appendix VI. The equipment may not allow testing of a cylinder unless the system has been properly calibrated.

(3) Test Procedure [Weldship APPENDIX III].

A written test procedure for performing UE of cylinders under the terms of this exemption must be at each facility performing ultrasonic examination. At a minimum, this procedure must:

(i) include a description of the test set-up; test

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parameters; transducer model number, frequency, and size; transducer assembly; couplant used; system calibration method and threshold gain used during the test; and other pertinent information such as additional gain used during the UE to confirm the defects.

(ii) require re-calibration of the test equipment when ultrasonic examination of 200 cylinders has been completed, or a time period of more than 4 hours has elapsed since equipment calibration, whichever occurs first. The equipment must be re-calibrated in accordance with paragraph 7.c.(2).

(iii) require that the rotational speed of a calibration piece must be such that all artificial defects are adequately detected, measured and recorded. The rotational speed of the cylinder under UE must not exceed the rotational speed used during the calibration

(iv) be made available to a DOT official when requested. Any change to the written procedure must be submitted to OHMEA as soon as practicable.

d. Ultrasonic Examination Acceptance/Rejection Criteria [Weldship Appendix VIII].

The equipment calibration, set up for testing and test procedure must be such that any cylinder found with the following defects must be rejected -

(1) In any area 0.70 in<sup>2</sup> or larger, the remaining wall thickness is less than the design minimum wall thickness ( $t_m$ ) or the maximum wall stress exceeds 58,000 psi for DOT-3A or 73000 psi for DOT-3AA specification cylinders. The maximum wall stress is calculated from the following formula:

$$S = P(1.3D^2 + 0.4d^2) / (D^2 - d^2)$$

where:

S = wall stress in pounds per square inch;

P = minimum test pressure in pounds per square inch;

D = outside diameter in inches;

d = D-2t, where t=minimum wall thickness determined by ultrasonic testing, in inches.

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(2) Isolated pits deeper than  $1/3t_m$  and larger than  $1/8$ " diameter for cylinders less than or equal to 4" in outside diameter, or larger than  $1/4$ " diameter for cylinders greater than 4" in outside diameter.

(3) SBT defects deeper than  $0.20t_m$  and longer than 1" in length.

(4) Weldshop will submit to OHMEA data from five calibration tests for each calibration standard and describe the type of ultrasonic wave that has been used for detecting and sizing each defect.

- e. Rejected cylinders. When a cylinder is rejected, the retester must stamp a series of X's over the DOT specification number and marked service pressure, or stamp "CONDEMNED" on the shoulder, top head, or neck using a steel stamp, and must notify the cylinder owner, in writing, that the cylinder is rejected and may not be filled with hazardous material for transportation in commerce.

(1) Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure.

(2) If a condemned cylinder contains hazardous materials and the testing facility does not have the capability of safely removing the hazardous material, the retester must stamp the cylinder "CONDEMNED" and affix conspicuous labels on the cylinder(s) stating: "UT REJECTED DOT-E 12247. RETURNING TO ORIGIN FOR PROPER DISPOSITION".

The retester may only offer the condemned cylinders by motor vehicle operated by a private carrier to a facility, identified to, and acknowledged in writing with OHMEA, that is capable of safely removing the hazardous material. A current copy of this exemption must accompany each shipment of condemned cylinders transported for the disposal of hazardous material.

- f. Marking. Each cylinder passing retest under the provisions of this exemption must be marked as prescribed in § 173.34(e)(6). In addition, each cylinder must be marked UE, in characters not less than  $1/4$  inch high at a location close to the retester's marking.

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g. Report. A report must be generated for each cylinder that is examined. The ultrasonic examination (UE) report must include the following:

- (1) UE equipment, model and serial No.
- (2) Transducer specification, size, frequency and manufacturer.
- (3) Specification of the calibration standard used to UE the cylinder. Calibration standards must be identified by serial number or other stamped identification marking.
- (4) Cylinder serial no. and type.
- (5) UE technicians' name and certification level
- (6) Test Date
- (7) Location and type of each defect on the cylinder (e.g. longitudinal line corrosion 5 inches from base).
- (8) Dimensions (area, depth and remaining wall thickness) and brief description of each defect.
- (9) Acceptance/rejection results.
- (10) The UE report must be on file at the test site, and made available to a DOT official when requested.

h. Personnel Qualification. Each person who performs retesting or who evaluates or certifies retest results must meet the following requirements:

(1) Project Manager - is the senior manager of Weldship responsible for compliance with DOT regulations including this exemption. Additionally, the project manager must ensure that each operator and senior review technologist maintain the required ASNT certification.

(2) The personnel responsible for performing cylinder retesting under this exemption shall be qualified to an appropriate Level (Level I, II or III)- Ultrasonic Testing in accordance with the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A depending upon the assigned responsibility as described below:

(i) As a minimum, a Level II Operator must perform system startup, calibrate the system, and review and certify the test results when written acceptance and rejection criteria for cylinders have been provided by a Senior Review Technologist. Based upon written criteria, the Level II Operator



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may authorize cylinders that pass the retest to be marked in accordance with paragraph 7.f. of this exemption. However, a person with Level I certification may perform a system startup, check calibration, and perform ultrasonic testing under the direct guidance and supervision of a Senior Review Technologist or a Level II Operator, either of whom must be physically present at the test site so as to be able to observe testing conducted under this exemption.

(ii) Senior Review Technologist (SRT) - is a person who reviews overall test results, provides supervisory training and technical guidance to operators, and reviews and verifies the retest results. A SRT must have a Level III Certification in UE, and a thorough understanding of the HMR pertaining to the re-qualification and reuse of the DOT cylinders authorized under this exemption. The SRT must prepare and submit the reports required in paragraphs 7(h) and annually verify that the UE program is being operated in accordance with the requirements of this exemption.

i. OPERATIONAL CONTROLS.

(1) No person may perform inspection and testing of cylinders subject to this exemption unless:

(i) that person is an employee or agent of Weldship and has a current copy of this exemption at the location of such inspection and testing, and

(ii) complies with all the terms and conditions of this exemption.

(2) The marking of the retester's symbol on the cylinders certifies compliance with all of the terms and conditions of this exemption.

(3) Each facility approved by OHMEA to test cylinders under the terms of this exemption must have a resident operator with at least a Level II Certification in UE.

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8. SPECIAL PROVISIONS.

a. During the initial use of the exemption, the test data, results, and additional technical information deemed pertinent in successful application of the retest procedure must be reported to OHMEA. The purpose of this information is to determine whether certain testing procedures and criteria require modification. In particular, special attention should be paid to evaluating and compiling information on any cylinders rejected by the ultrasonic examination procedure. For any rejected cylinder, the defect causing the rejection must be fully characterized and profiled. That is, the specific type of defect should be identified (i.e. line corrosion or general corrosion) and the specific size of the defect should be determined (i.e. length, depth, width, diameter, area, etc.). The cylinder type, size, minimum design wall thickness, age, etc. of the rejected cylinder must be reported. The ultrasonic signal profile should be reported for any defect causing the cylinder to be rejected. These results must be summarized and reported to OHMEA on an annual basis. Weldship must submit to DOT an evaluation of the effectiveness of the ultrasonic testing program authorized by this exemption as part of any request to renew the exemption submitted in accordance with § 107.109.

b. The total number of cylinders tested under this exemption must be reported by type (i.e. 3A, 3AA) and age. The number of cylinders rejected and the total number of cylinders tested in each lot inspected under the provision of this exemption must be reported by cylinder type and age. These results must be summarized and reported to DOT on an annual basis.

c. A cylinder that meets the requirements of this exemption and the introductory text and paragraph (1) of § 173.302(c) may be marked with a plus sign (+) following the test date marking on the cylinder. In addition, a cylinder that meets the requirements of this exemption and of § 173.34(e)(16) may be marked with a "star".

d. Offerors may use the cylinders specified when examined in accordance with the provisions of this exemption for the transportation in commerce of those hazardous materials specified herein, provided no modifications or changes are made to the cylinders, and all terms of this exemption are complied with.

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e. Shippers using the packaging covered by this exemption must comply with the provisions of this exemption, and all other applicable requirements contained in 49 CFR Parts 100-180.

9. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, rail freight, cargo vessel, passenger carrying aircraft, and cargo-aircraft only.
10. MODAL REQUIREMENTS. None, other than as required by the HMR.
11. COMPLIANCE. Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq.:
  - o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180, unless expressly exempted by this exemption.
  - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect unless a regulation has been amended making the exemption no longer necessary.

12. REPORTING REQUIREMENTS. The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing, as soon as practicable of any incidents involving the package and shipments made under this exemption.

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Issued in Washington, D.C.:



Robert A. McGuire  
Acting Associate Administrator for  
Hazardous Materials Safety

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(DATE)

Address all inquiries to: Associate Administrator for Hazardous  
Materials Safety, Research and Special Programs Administration,  
Department of Transportation, Washington, D.C. 20590.  
Attention: DHM-31.

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